CLAIMS

We claim:

1. A method for determining near-end cross-talk effects, the method comprising:

inputting a test signal into at least one conductor of a transmission cable;

receiving a raw cross-talk signal from at least another conductor of the transmission cable; and

processing the raw cross-talk signal in the frequency domain to determine a combination of near-end cross-talk components thereof, said combination of components being characteristic of the near-end cross-talk effects.

2. A method for determining near-end cross-talk effects according to claim 1, wherein the test signal has a frequency that is swept, each time by a predefined sweep frequency step, across a predetermined sweep frequency range, and wherein the near end cross-talk components include at least one of a cross-talk component that is non-periodic over the sweep frequency range and a cross-talk component that has a repetition period of more than a predetermined number of sweep frequency steps.

3. A method for determining near-end cross-talk effects according to claim 2, wherein the combination of near end cross-talk components is obtained by averaging the raw cross-talk signal.

4. A method for determining near-end cross-talk effects according to claim 3, wherein the averaging of the raw cross-talk signal is performed using the function

$$X1(n) = \frac{1}{2K+1}\sum_{m=-K}^{m=K} X(m+n)$$

wherein

$X1(n)$ is the averaged cross-talk signal value at a sweep frequency $n\Delta f$,

$X(n)$ is the raw cross-talk signal value at a sweep frequency $n\Delta f$,

Δf is the predefined sweep frequency step,

K is a positive integer, which corresponds to about half a predetermined number of discrete magnitude values for performing the moving average,
m is an integer from $-K$ to K, and
n is a positive integer.

5. A method for determining near-end cross-talk effects according to claim 3, wherein the averaging of the raw cross-talk signal comprises:

a) performing a moving average operation over a predetermined number of discrete magnitude values of the raw cross-talk signal to obtain an averaged cross-talk signal; and

b) repeating a) on the average cross-talk signal obtained from a preceding moving average operation for a predefined number of times to obtain the combination of near end cross-talk components that is characteristic of the near-end cross-talk effects.

6. A method for determining near-end cross-talk effects according to claim 3, wherein the averaging of the raw cross-talk signal comprises:

a) performing a first moving average operation over a predetermined number of discrete magnitude values of the raw cross-talk signal to obtain a first averaged cross-talk signal;

b) performing a second moving average operation over the predetermined number of discrete magnitude values of the first averaged cross-talk signal to obtain a second averaged cross-talk signal; and

c) performing a third moving average operation over twice the predetermined number of discrete magnitude values of the second averaged cross-talk signal to obtain the combination of near end cross-talk components that is characteristic of the near-end cross-talk effects.

7. A method for determining near-end cross-talk effects according to claim 1, wherein the test signal has a frequency that is swept between 1 megahertz and 350 megahertz.

8. A method for removing near-end cross-talk effects from a raw cross-talk signal, the method comprising:

inputting a test signal into at least one conductor of a transmission cable;

receiving the raw cross-talk signal from at least another conductor of the transmission cable;

processing the raw cross-talk signal in the frequency domain to determine a combination of near-end cross-talk components thereof, said combination of components being characteristic of the near-end cross-talk effects; and

subtracting the combination of near-end cross-talk components from the raw cross-talk signal to remove the near-end cross-talk effects.

9. A system for determining near-end cross-talk effects originating from a near-end location of the system, a near end portion of the system being connectable to a transmission cable comprising a plurality of conductors, the system comprising:

an injecting unit being adapted to generate and input a test signal into at least one conductor of the transmission cable;

a receiving unit being adapted to receive a raw cross-talk signal from at least another conductor of the transmission cable; and

a processing unit being adapted to process the raw cross-talk signal in the frequency domain to determine a combination of near-end cross-talk components thereof, said combination of components being characteristic of the near-end cross-talk effects.

10. A system for determining near-end cross-talk effects according to claim 9, wherein the test signal has a frequency that is swept, each time by a predefined sweep frequency step, across a predetermined sweep frequency range, and wherein the near-end cross-talk components include at least one of a cross-talk component that is non-periodic over the sweep frequency range and a cross-talk component that has a repetition period of more than a predetermined number of sweep frequency steps.

11. A system for determining near-end cross-talk effects according to claim 10, wherein the processing unit is adapted to obtain the combination of near end cross-talk components by averaging the raw cross-talk signal.

12. A system for determining near-end cross-talk effects according to claim 11, wherein the processing unit is adapted to average the raw cross-talk signal by using the function

$$X1(n) = \frac{1}{2K+1}\sum_{m=-K}^{m=K} X(m+n)$$

wherein

$X1(n)$ is the averaged cross-talk signal value at a sweep frequency $n\Delta f$,

$X(n)$ is the raw cross-talk signal value at a sweep frequency $n\Delta f$,

Δf is the predefined sweep frequency step,

K is a positive integer, which corresponds to about half predetermined number of discrete magnitude values for performing the moving average,

m is an integer from –*K* to *K*, and

n is a positive integer.

13. A system for determining near-end cross-talk effects according to claim 11, wherein the processing unit is adapted to average the raw cross-talk signal by:

a) performing a moving average operation over a predetermined number of discrete magnitude values on the raw cross-talk signal to obtain an averaged cross-talk signal; and

b) repeating a) on the average cross-talk signal obtained from a preceding moving average operation for a predefined number of times to obtain the combination of near end cross-talk components that is characteristic of the near-end cross-talk effects.

14. A system for determining near-end cross-talk effects according to claim 11, wherein the processing unit is adapted to average the raw cross-talk signal by:

a) performing a first moving average operation over a predetermined number of discrete magnitude values of the raw cross-talk signal to obtain a first averaged cross-talk signal;

b) performing a second moving average operation over the predetermined number of discrete magnitude values of the first averaged cross-talk signal to obtain a second averaged cross-talk signal; and

c) performing a third moving average operation over twice the predetermined number of discrete magnitude values of the second averaged cross-talk signal to obtain the combination of near end cross-talk components that is characteristic of the near-end cross-talk effects.

15. A system for determining near-end cross-talk effects according to claim 9, wherein the test signal has a frequency that is swept between 1 megahertz and 350 megahertz.

16. A system for determining near-end cross-talk effects according to claim 9, wherein the receiving unit is a phase locked loop receiver.

17. A system for determining near-end cross-talk effects according to claim 9, wherein the processing unit is a microprocessor.

18. A system for determining near-end cross-talk effects according to claim 9, the system further comprises an analog to digital converting unit being adapted to digitize the raw cross-talk signal received by the receiving unit.

19. A system for determining near-end cross-talk effects according to claim 9, wherein the system is implemented in a portable testing instrument.

20. A system for determining near-end cross-talk effects according to claim 9, wherein the injecting unit, the receiving unit and the processing unit are contained within a hand held testing instrument.